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## AF141-068: Generic Power/Propulsion Microcontroller for Unmanned Aircraft Systems (UAS)

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: Develop and demonstrate a small, common controller that can efficiently control all aspects of propulsion and power management for UAS vehicles. DESCRIPTION: The use of UASs has greatly increased over the last 12 years and these systems are assuming greater operational roles in the field, becoming force multipliers for the military. Current controls for UAS propulsion, especiall ...

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# 2. AF141-070: Lithium-Ion (Li-ion) Battery Electrolytes using Nonflammable, Room-Temperature Ionic Liquids

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: The purpose of this effort is to develop an ionic liquid based electrolyte for lithium-ion batteries that is nonflammable, has a high ionic conductivity over a wide temperature range, and is electrochemically stable to ensure long battery lifetimes. DESCRIPTION: Rechargeable Li-ion batteries can fail violently when subjected to an internal electrical short, are overheated, crush ...

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#### 3. AF141-071: Safe, Large-Format Lithium-Ion (Li-ion) Batteries for Aircraft

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: The purpose of this effort is to develop safe, large-format aircraft Li-ion batteries where propagation of a cell failure is minimized. DESCRIPTION: Rechargeable Li-ion batteries can fail violently when subjected to an internal electrical short, are overheated, crushed, or when then are overcharged/overdischarged. Recent events such as the grounding of a commercial aircraft due ...

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#### 4. AF141-072: Fiber-Optic-Distributed Temperature Sensing System

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: Develop a fiber-optic-distributed sensor system that will sense bleed air leaks in the propulsion, environmental control, and thermal management systems (TMSs) to increase survivability throughout the operating mission of advanced tactical aircraft. DESCRIPTION: Advanced tactical aircraft are required to provide protection to fire throughout the operating mission flight envelope ...

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## **5.** <u>AF141-073: Single-port Fiber-optic Probe for Imaging and Spectroscopy in Practical Combustion Systems</u>

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: Develop and demonstrate a compact, fiber-optic-based probe enabling multidimensional imaging and line-of-sight absorption spectroscopy for local measurements of gas properties (e.g.,temperature and combustion species) in practical combustion systems. DESCRIPTION: Specifically desired is a multi-purpose probe enabling a number of key measurements in practical devices that include ...

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# **6.** <u>AF141-074: Developing Failure Stability in High-Reliability Sensor Design and Applications</u>

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: Develop an innovative engine sensor system for harsh environmental conditions that is more reliable and affordable than existing passive control and monitoring sensors for legacy and future turbine engine platforms. DESCRIPTION: A significant challenge in developing aerospace engine and vehicle sensor systems is reliability. The issues involve multiple considerations, including ...

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#### 7. AF141-075: Improved Design Package for Fracture Mechanics Analysis

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: Develop an improved software design package that better accounts for short crack effects in crack growth. DESCRIPTION: Linear elastic fracture mechanics (LEFM) methods are used extensively in aerospace to perform crack growth life predictions. These methods are sometimes erroneously applied in cases where the initial defect size assumptions are outside the range of strict LEFM a ...

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### 8. AF141-076: Modular Flexible Weapons Integration

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: Develop store carriage technology for advanced aircraft that will increase weapons load out, reduce drag, extend range, and not compromise survivability over current carriage techniques. DESCRIPTION: The mission of tactical, strike, and attack aircraft, manned or unmanned, is to deliver an effective load of weapons to the designated target with minimal collateral damage. In orde ...

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## **9.** <u>AF141-080</u>: <u>Air Cycle Toolsets for Aircraft Thermal Management System (TMS) Optimization</u>

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: Development of complementary hardware and software toolsets which allow assessment and characterization of different military aircraft air cycle or hybrid-cycle thermal management system architectures. DESCRIPTION: Current tactical aircraft face enormous challenges associated with increasing operational envelope while reducing fuel burn. To that aim, there is a growing desire wi ...

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## **10.** AF141-081: Launch Vehicle Systems Intended to Execute Suppressed Trajectories for Hypersonic Testing

Release Date: 11-20-2013Open Date: 12-20-2013Due Date: 01-22-2014Close Date: 01-22-2014

OBJECTIVE: Develop an innovative approach(es) for new and/or existing launch systems to execute suppressed trajectories for hypersonic flight testing. Perform analysis and testing to mature technology, validate models, reduce risk, and demonstrate capability. DESCRIPTION: The Air Force is working on next-generation hypersonic systems for various missions,



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